Operating Instructions

Ultrasonic Cleaning Units

297700

OPTOSONIC *silence*

B&S QUALITY MADE

• english •

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document ref. 104 8498

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1 General

The present Operating Instructions are part of the delivered equipment. They must be ready for use at any time and remain with the unit in case of resale.
We reserve the right to carry out technical modifications on the unit due to advanced development.
An operating manual cannot take account of every conceivable use. An operating manual cannot take account of every possible use. Contact your dealer or the manufacturer for further information or in the event of problems which are not covered or not sufficiently covered in this operating manual

2 Important safety warnings

Please observe any additional national safety regulations that may apply.

2.1 Instructions for the use of the present manual

Carefully read the Operating Instructions before you operate the unit. Do not use the present electrical unit for any purpose other than described in the Operating Instructions.

Warning symbols used in the present manual:

This symbol warns of the risk of injury and damage to the equipment.

This symbol warns of the risk of injury caused by electricity.

This symbol warns of the risk of injury caused by explosion and/or deflagration.

This symbol marks additional information.

Signal words used in the present manual:

Danger The signal word danger warns of a potential risk of serious injury and danger to life.

Warning The signal word warning warns of the risk of serious injury and heavy damage to the equipment.

Caution The signal word caution warns of the risk of light injury or damage to the equipment.

Attention The signal word attention warns of the risk of damage to the equipment.

2.2 Instructions for the use of the unit

Intended use

The present Elma ultrasonic cleaning unit has been designed for the treatment of **items** and **liquids** only.

No cleaning of living beings or plants!

User

Operation of the unit by authorized and instructed staff only. Observe the instructions given in the manual.

Mains connection

For safety reasons, the present unit must be connected to a correctly grounded socket only. The technical details indicated on the nameplate must correspond with the available mains connection details, in particular those of the mains voltage and current connected value.

Prevention of electrical accidents

For purposes of maintenance and care of the unit, in case of suspected humidity inside the unit or in case of malfunctions and after operation pull the mains plug.
The unit must be opened by authorised specialised personnel only.

Cleaning liquid

Fill the unit with a sufficient quantity of cleaning liquid before switch-on. Flammable liquids must not be treated by ultrasound directly in the cleaning tank: risk of fire and explosion!

Noise emission

Ultrasonic units can produce annoying sounds.
Wear personal ear protection devices when working close to an ultrasonic unit which is operated without cover.

Sound transmission at physical contact

Do not reach inside the cleaning liquid or touch sound-carrying parts (tank, basket, cleaning items, etc.) during operation.

Exclusion of liability

The manufacturer cannot be held liable for damages on persons, equipment or cleaning items caused by improper use. The operator is responsible for the instruction of the operating staff.

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3 Functioning

Today, cleaning by ultrasound is the most modern fine cleaning method.

The electric high-frequency energy created by an ultrasonic generator is transformed into mechanical energy by piezo-electrical transducer systems and is then transmitted into the bath.
This process creates millions of tiny vacuum bubbles which implode due to the variations of pressure caused by the ultrasonic activity. Highly energetic liquid jets are created. These jets remove dirt particles from surfaces and even from the smallest grooves and bores.

3.1 Ultrasonic cleaning factors

Basically, the cleaning result depends on four factors:

Mechanical energy

Ultrasonic energy is probably the most important mechanical factor in the cleaning process. This energy must be transmitted through a liquid medium to the surfaces which are to be cleaned.

The present Elmasonic unit is fitted with the innovative sweep function device: electronic oscillation of the sound field (sweep function) prevents the formation of zones of low performance in the ultrasonic bath.

Cleaning media

For saponification and removal of the dirt particles a suitable cleaning agent is required. Elma has a large range of cleaning media on offer.

Cleaning chemicals are also necessary to reduce the surface tension. This increases considerably the efficiency of the ultrasonic activity.

Cleaning period

The cleaning period depends on the degree and the kind of contamination and on the correct selection of ultrasonic energy, cleaning agent and temperature.

4 Product description

4.1 OPTOSONIC silence product features

- cleaning tank made of cavitation-resistant stainless steel
- casing made of stainless steel, hygienic and easy to clean.
- high performance sandwich transducer systems.
- sweep function for an optimised sound field distribution in the cleaning liquid.
- degas function for the efficient degassing of the cleaning liquid and for laboratory purposes.
- auto degas function for automatic degassing cycles, i.e. with fresh cleaning liquids.
- plug-in mains supply electronical turning knobs.
- splash-water-proof operating panel.
- automatic switch-off after 12 h operation to prevent unintended permanent operation.

4.2 CE conformity

The present Elma ultrasonic unit is in compliance with the CE marking criteria.

The declaration of conformity is available from the manufacturer.

4.3 Delivered equipment

- Ultrasonic cleaning unit
- Mains cable
- Operating Instructions

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4.4 Description of operating elements

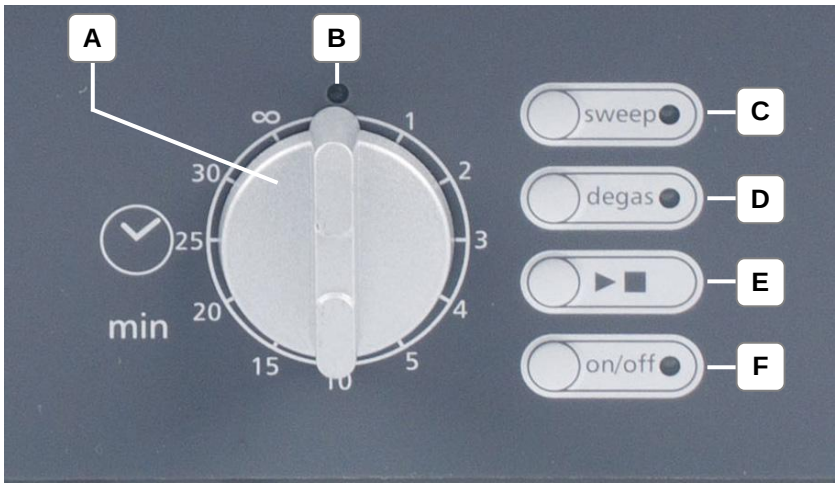

Illustration 4.4 View operating elements

A **Turning knob cleaning period ***
Setting options for short-period operation: 1; 2; 3; 4; 5; 10; 15; 20; 25; 30 min (with automatic switch-off).
Permanent position ∞ for continued operation. Here the unit must be switched off by hand.
For safety reasons the unit is automatically switched off after 12h permanent operation.

B **Temperature LED** (applies only for units with heating) indicates heating operation.

C **Key sweep function** for an optimised sound field distribution in the cleaning liquid; Sweep LED.

D **Key degas function** for the efficient degassing of fresh cleaning liquid and for special applications in the laboratory; Degas LED.

E **Key start/stop for ultrasonic operation** and temperature-controlled operation. Ultrasonic LED

F **Key on/off** for switching the unit on and off; on/off LED

* for setting the value: turn knob **clockwise**
for resetting the value: turn knob **anti-clockwise**

4.5 Operating and display functions

Action	Setting	Result	Display
switch on unit	press on/off key	unit is ready for operation	on/off LED is on
switch off the unit	press on/off key	unit is switched off	all displays are off
start ultrasound - now -	select period by turning knob for cleaning period press key ▶■ (ultra-sound)	ultrasound is operating	ultrasound LED is on
stop ultrasound before end of set period	turn set period to 0 or press key ▶■	ultrasound switched off	ultrasound LED is off
switch on sweep function* * sweep and degas cannot be operated at the same time	select set period press key ▶■ press key sweep	ultrasound operates in sweep mode	sweep LED is on ultrasound LED is on
switch off sweep function	press key sweep	sweep function is switched off ultrasound continues in standard operating mode	sweep LED is off ultrasound LED is on
switch on degas function* * sweep and degas cannot be operated at the same time	select set period press key ▶■ press key degas	ultrasound operates in degas mode	degas LED is on ultrasound LED is on
switch off degas function	Press key degas	degas function is switched off ultrasound continues in standard operating mode	degas LED is off ultrasound LED is on
switch on auto degas function* * sweep and degas cannot be operated at the same time	press key ▶■ keep degas key pressed > 2 sec	ultrasound operates in auto degas mode for 10 minutes and then switches off	degas LED blinks ultrasound LED blinks

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5 Initial operation

Packing

Please keep the original packing or dispose of it according to the relevant waste disposal regulations. You can also return the packing to the manufacturer free destination (to your account).

Check for transport damages

Check the OPTOSONIC silence for possible transport damages before initial operation. In case of visible damage do not connect the unit to the mains. Contact your supplier and forwarding agent.

Placement

For operation, place the unit on a dry and solid surface. Ensure that the workplace is sufficiently ventilated!

Do not use a soft surface (e.g. a carpet) as this may impede the ventilation of the unit.

DANGER

Risk of electrocution due to humidity inside the unit!
Protect the unit from entering humidity.

The unit inside is splash-water-proof. Keep workplace and casing dry in order to prevent electrical accidents and damages on the unit.

Ambient conditions

- Allowed ambient temperature during operation: +5°C - +40°C
- Allowed relative humidity of air during operation: max. 80%
- In-door operation only

5.1 Connecting the unit to the mains

Required mains conditions

Earth grounded socket:
1 phase (220-240 V); 1 N; 1 PE protective earth.

The power supply must be protected by an earth leakage circuit breaker.

Connect mains cable

Use the plug-in mains cable delivered with the unit. Connect the unit to a grounded shockproof socket only. Ensure that the values indicated on the nameplate of the unit correspond with the available connecting conditions.
The mains plug must be connected to an easily accessible socket only, as it serves as interrupted device!

6 Putting unit into operation

6.1 Filling of the unit

Observe filling level

Fill the cleaning tank with a sufficient quantity of a suitable cleaning liquid before switch-on.

The optimum filling level is approx. 2/3 of the tank volume.

Suitable cleaning agents

Ensure that the chosen cleaning agent is suitable for treatment in an ultrasonic bath and observe the instructions on dosage and the compatibility of the material.
We recommend the use of the cleaning agents listed in *section 8.3.*

Prohibited cleaning agents

Flammable products are generally not allowed for use in an ultrasonic bath. Observe the safety warnings given in *section 8.1.*

DANGER

Risk of fire and explosion!

Never use flammable liquids or solvents directly in an ultrasonic cleaning bath.

Use the cleaning chemicals listed in *section 8.3*.

Ultrasonic activity increases the vaporisation of liquids and creates a very fine mist which can catch fire on any ignition source.
Observe the instructions on limitations of use given in *section 8.1.*

CAUTION

Risk of damage to the transducer tank!

Do not use any acid cleaning agents (pH value < 7) directly in the stainless steel tank if the cleaning items or the contamination of the cleaning items contain halogenides (fluorides, chlorides or bromides). The same applies to NaCl solutions.

Use the cleaning chemicals listed in *section 8.3*.

The stainless steel tank can be destroyed by crevice corrosion in a very short time. Substances that cause crevice corrosion can be contained in household cleaners.

Observe the instructions on limitations of use given in *section 8.2.*

For queries please contact the manufacturer or your supplier.

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6.2 Placement of cleaning items

Caution! The ultrasonic bath has been designed for the ultrasonic treatment of items and liquids only.
Do not clean living beings or plants!

CAUTION

Do not reach inside the tank during ultrasonic operation!

Cell walls can be damaged by prolonged exposure to ultrasonic activity.

For placing and taking out the cleaning items always switch off the unit.

No cleaning items on the bottom of the tank

Do not place the cleaning items directly onto the bottom of the cleaning tank, as this might lead to damages to the unit.

Use cleaning basket

Place the cleaning items into the stainless steel cleaning basket (accessory equipment).

Acid tank

For the use of cleaning chemicals which might destroy or damage the stainless steel tank use a separate container. For the special plastic cleaner tank for acid chemicals please contact your supplier.

6.3 Degassing of liquid

Freshly mixed cleaning liquids are saturated with air which lessens the cleaning effect of the ultrasonic activity. By sonification of the liquid over a period of several minutes before the cleaning process the tiny air bubbles in the liquid are eliminated.

Degas key

Degas the fesh cleaning liquid for approx. 5 - 10 minutes. For switch-on and switch-off press the degas key.

Auto degas

The OPTOSONIC silence units are equipped with an auto degas option.
When the programmed period has finished, the degas function is automatically switched off (10 min).

How to proceed

See chart 4.5.
Degas and sweep functions cannot be operated at the same time.

7 Ultrasonic cleaning process

Please observe the following instructions before starting the ultrasonic cleaning process.

It is the user's responsibility to check the cleaning results.

CAUTION

Ultrasonic units can produce annoying sounds.

Wear personal ear protection devices when working close to an ultrasonic unit which is operated without cover.

ATTENTION

Sensitive surfaces can be damaged when exposed to ultrasound over prolonged periods, particularly at low cleaning frequencies.

Ensure that sensitive surfaces are exposed to ultrasonic acitivity for a suitable period only.

If in doubt check the cleaning progress regularly and observe the state of the surface material.

ATTENTION

Ultrasonic energy is physically transformed into heat.

The unit and the cleaning liquid in the tank heat up during ultrasonic operation even with the heating switched off. During permanent operation with cover temperatures exceeding 60°C can be reached.

For the cleaning of temperature-sensitive items please take into consideration the heating-up of the cleaning liquid.

Please observe that the temperature of the cleaning media remains below 42°C when cleaning parts contaminated with fresh protein or blood.

7.1 Starting the cleaning process manually

Press the on/off key to start the unit.

Set cleaning time

Use the turning button to set the required cleaning time.

LED off.

Short period operation

For short period operation set the required cleaning period at the turning knob.

Press the ►■ key to start the ultrasonic operation.

The unit starts the ultrasonic cleaning process. LED on.

The ultrasound is automatically switched off when the set period has run down.

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Permanent operation

For permanent operation turn the turning knob clockwise into ∞ position. In this operating mode there is no automatic switch-off. The ultrasonic activity must be switched off by hand after the cleaning process has been finished; press the ►■ key to switch of. Alternatively, turn the turning knob back into “0” position.

Caution: Turn the turning knob only anti-clockwise into “0” position!

In order to avoid unintended permanent operation, the OPTOSONIC silence units are equipped with a safety switch-off automatically. The unit switches off completely after 12 h permanent operation. In case you wish to continue operation start the unit again.

7.2 Sweep function

OPTOSONIC silence units are equipped with an optional sweep function.

Functioning

A more homogeneous sounding of the cleaning bath is achieved by the continued displacement of the sound pressure maxima in the cleaning liquid.

Particularly for large cleaning items it may be useful to switch on the sweep function.

How to proceed

Press the sweep key to switch on or off.

Sweep and degas functions cannot be operated at the same time.

7.3 After the cleaning

Follow-up treatment of cleaning items

When the cleaning process is finished rinse the cleaning items, e.g. under the tap.

Drain the unit

Drain the liquid as soon as it is dirty or when the unit is not operated over a prolonged period of time. Certain residues and types of contamination may destroy or damage the stainless steel tank.

8 Cleaning media

WARNING

The cleaning chemical to be used must be suitable for the use in an ultrasonic bath to prevent damage to the tank or injuries to the user. Use the recommended cleaners mentioned in *section 8.3*. Observe the restrictions to cleaners containing solvents and aqueous cleaners mentioned *in sections 8.1 and 8.2.*

For queries please contact the manufacturer or your supplier.

Exclusion of liability

Damages caused by non-compliance with the instructions given in *sections 8.1 and 8.2* will not be covered by the manufacturer's warranty!

8.1 Limitations of use of cleaners containing solvents

GEFAHR

Never use flammable liquids or solvents directly in an ultrasonic cleaning tank. Risk of fire and explosion!

Ultrasound increases the volume of vaporisation of liquids and creates a very fine mist that can catch fire on any ignition source at any time.

Do **not** fill potentially explosive substances and flammable solvents

- marked in compliance with the EEC directives by symbols and safety warnings R 1 to R 9
- or E, F+, F, O or R 10, R 11 or R 12 for flammable substances

into the stainless steel tank for ultrasonic treatment.

Exception

In compliance with the general regulations on the protection of labour, certain limited volumes of flammable liquids (max. 1 litre) can be used in an ultrasonic cleaning unit under the following conditions: these liquids must be filled into a suitable separate vessel (e.g. beaker) with sufficient ventilation; this vessel (beaker) can then be put into the stainless steel tank which is filled with non-flammable liquid (water with a few drops of surfactant).

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8.2 Limitations on aqueous cleaners

Do not use aqueous cleaning media with pH values in the acid range (pH < 7) directly in the ultrasonic tank if fluoride (F^-), chloride (Cl^-) or bromide (Br^-) ions can be taken in by the removed dirt or through the cleaning chemical. These can destroy the stainless-steel tank by crevice corrosion within a very short period of ultrasonic operation.

Acids and alkaline solutions

Other media which can destroy the stainless-steel tanks when used in high concentrations or with high temperatures during ultrasonic operation are: nitric acid, sulphuric acid, formic acid, hydrofluoric acid (even diluted). (Completeness of list not guaranteed.)

Risk of damage to the unit: do not use cleaning solutions containing more than 0.5 mass % alkali (KOH and/or NaOH) in an ultrasonic cleaning tank.

Entrainment of chemical substances

The above limitations for the use of chemicals in an ultrasonic bath also apply for the aforementioned chemicals when these are brought into an aqueous (particularly distilled water) bath through entrainment or from the removed dirt.

Acid-resistant tank

For the ultrasonic treatment with the above mentioned media use an acid-resistant tank (available as accessory equipment).

Disinfectants

The limitations of use also apply to the standard cleaners and disinfectants if these contain the above mentioned compounds.

Safety regulations

Observe the safety warnings indicated by the manufacturer of the chemicals (e.g. goggles, gloves, R and S phrases).

For queries please contact the manufacturer or your supplier.

8.3 List of recommended cleaning media

Elma has a large range of suitable cleaning products on offer developed by chemical engineers in the Elma laboratory. Please contact your supplier to find the most suitable cleaning chemical for your application.

Environment – friendly products

The organic detergents contained in the elma clean cleaning concentrates are biodegradable. Product informations and safety data sheets are available from the manufacturer.

elma opto clean

Cleaning concentrate for glasses, frames, optical lenses and components. Also suitable for plastics.

9 Maintenance

9.1 Maintenance / Care

ATTENTION

Pull the mains plug before carrying out any maintenance works!

Electrical security
The present OPTOSONIC silence unit is maintenance-free. Check the casing and the mains cable for damage regularly in order to prevent electrical accidents.

Care of transducer tank
Lime deposits on the stainless-steel tank can be cleaned gently e.g. with elma clean 40 or elma clean 115C (operate the unit with concentrate + water).

Care of casing
Residues of cleaning media can be wiped away with a household cleaner or decalcifier depending on the kind of contamination. **Do not put the unit in or under water!**

Disinfection
If the unit is used for medical and sanitary purposes it is necessary to disinfect the transducer tank and the surfaces regularly (standard surface disinfectants).

9.2 Service life of the transducer tank

The transducer tank and particularly the ultrasound transmitting surfaces are wear parts. The changes on the surfaces that occur after a certain operating period are visible first as grey areas and later on as material abrasions, the so-called cavitation erosion.

To prolong the service life of your ultrasonic unit even more we recommend to observe the following instructions:

- Regularly remove any cleaning residues, in particular metal particles and rust films.
- Use suitable cleaning chemicals, with particular caution concerning the kind of removed contamination (see instructions *section 8.2*).
- Abrasive particles from removed contaminations (e.g. polishing pastes) must be drained and removed from the cleaning tank as frequently as possible (exchange the cleaning bath).
- Exchange the cleaning medium before it is too heavily contaminated.
- Do not operate the ultrasound unnecessarily; switch off after the cleaning process.

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9.3 Repair

Opening by authorised specialised personnel only

Repair and maintenance works which require the unit to be connected and opened must be carried out by authorised and specialised personnel only.

DANGER

Risk of electrocution due to live parts inside the unit!

Pull the mains plug before opening the unit!

The manufacturer cannot be held responsible for any damage caused by unauthorised maintenance or repair works on the unit.

In case of a break-down of the unit please contact the manufacturer or your supplier.

10 Technical details

Tank max. volume (approx. litre)	Tank effective volume (approx. litre)	Tank internal dimensions W x D x H (approx. mm)	Unit external dimensions W x D x H (approx. mm)	Basket internal dimensions W x D x H (approx. mm)	Weight (approx. kg)
0,8	0.7	190x85 x 60	206x116x178	177x73x30	2,0

Mains voltage unit variants (Vac)	Ultrasound frequency (kHz)	Power consumption total (W)	Ultrasonic power RMS (W)	Ultrasonic maximum peak power* (W)
220-240	80	30	30	240

* The signal form of the wave results in a factor 4 or 8 for the ultrasonic peak max., depending on the modulation of the wave.

11 Trouble shooting

Fault	Possible cause	Remedy
Casing damaged	• damage by third party, transport damage	• return unit to supplier or manufacturer
Mains cable damaged	• damage by third party, transport damage	• obtain original spare mains cable from manufacturer or supplier
No operating functions; all LEDs dark	• mains cable not plugged in	• plug in mains cable
	• socket dead	• check socket/fuse
	• mains cable damaged/interrupted	• replace mains cable
	• fault of electronics	• return unit to supplier or manufacturer
No ultrasonic function; LED ultrasound dark	• turning knob for ultrasonic operation in „0“ position	• switch on the turning knob for ultrasonic operation
	• unit is switched off	• switch on the unit at key on/off
	• key ►■ (ultrasound) not pressed	• press key ►■
	• fault of electronics	• return unit to supplier or manufacturer
No ultrasonic operation; LEDs of LED cleaning period blink alternately ("running light") = fault indication ultrasound	• fault of electronics	• switch unit off and on if fault is indicated again: return unit to supplier or manufacturer
Unsatisfactory cleaning results	• no or unsuitable cleaning medium used	• use suitable cleaning medium
	• cleaning period too short	• repeat cleaning interval

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12 Putting out of action and waste disposal

The unit can be taken to metal and electronics recycling stations or returned to the manufacturer.

13 Manufacturer's contact address

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Subject to technical and visual modifications. Elma_ch_02.2012